Future of manufacturing

Trade scenario: Employment implications in Europe of a large increase in global tariffs

Eurofound

European Foundation for the Improvement of Living and Working Conditions

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Introduction

This report will examine the possible impact of a significant hike in tariffs between the major trading areas of the world and focus on the implications of this for employment in Europe up to 2030. The report is part of the Future of Manufacturing in Europe pilot project, delegated to Eurofound by the Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW). According to Eurostat, in 2016 manufacturing accounted for 83% of EU exports and the United States (US) is by far the most common destination for goods exported from the EU. Its share of 20% was more than that of the next two countries combined. Thus, a US-led hike in tariffs is of fundamental relevance for the future of manufacturing in Europe.

Trade protectionism started to increase after the Great Recession of 2008. Indeed, there is considerable empirical historical evidence of an association between protectionism and recession (see, for example, Bown and Crowley, 2013). While in the first years of the recent recession outright tariff hikes were limited and rare, there are other means of restricting international trade. Georgiadis and Gräb (2013) identified a number of enacted policies that served to restrict trade, such as local clauses in stimulus and bailout packages.

However, with the arrival of the Trump administration in the US, protectionist measures have been radically ramped up to reach a scope and a scale that are unprecedented in living memory. In early 2017, the US refused to ratify the Trans-Pacific Partnership, a proposed free trade agreement with 12 Pacific Rim countries. In March 2018, the US introduced tariffs of 25% on steel and 10% on aluminium for products imported from China and the EU.

In July 2018, the US imposed additional tariffs of 25% on USD 34 billion (about €29 billion as per October 2018) of other imported Chinese goods, which led China to respond with similarly sized tariffs on US products. A tariff of an additional USD 16 billion (€14 billion) on Chinese imports was added in mid-August, with China responding proportionately. At the time when this scenario was prepared, President Trump threatened to abandon the North American Free Trade Agreement (NAFTA) trade deal with Canada and Mexico and this prospect is included in the scenario reported below. However, a new trade deal, renamed the US–Mexico–Canada Agreement, was subsequently announced in October 2018.

In such a rapidly changing and volatile environment, the rules of global trade are being rewritten such that it is impossible to identify a new tariff regime that could be predicted to last for any reasonable length of time. Hence, the research strategy adopted here is to construct a scenario assuming a very significant and specific global tariff hike in order to explore the implications of such developments for global growth and employment.

The scenario assumptions are in principle rather conveniently incorporated into the E3ME global macroeconometric model (see Box 1) used to construct the scenario by simply adding the tariff hikes to the price of traded goods. The assumed future tariff rates are detailed in the next section.

The results presented include the impact of the tariff hikes on GDP in the world's major trading areas, although the main focus is on employment in Europe. This includes an analysis of the changes in occupational wage structure, utilising Eurofound's European Jobs Monitor (see Eurofound, 2018).

Box 1: The E3ME model

E3ME is a global macroeconometric model designed to address major economic and economy–environment policy challenges. Developed over the last 20 years by Cambridge Econometrics, it is one of the most advanced models of its type. Its strengths are listed below.

- **It offers a high level of disaggregation, enabling detailed analysis of sectoral and country-level effects from a wide range of scenarios. Social impacts are important model outcomes.**
- **Its econometric specification addresses concerns about conventional macroeconomic models and provides a strong empirical basis for analysis. It can fully assess both short- and long-term impacts and is not limited by many of the restrictive assumptions common to computable general equilibrium models.**
- **It enables integrated treatment of the world's economies, energy systems, emissions and material demands. This enables it to capture two-way linkages and feedback between these components.**

E3ME covers 59 global regions, with a detailed sectoral disaggregation in each one, and projects annually up to 2050. It is frequently applied at national level, in Europe and beyond, as well as for wider (European and global) policy analysis (Cambridge Econometrics, n.d.).

The baseline projection, to which the projections in this report are compared, incorporate the Eurostat population forecast available in 2017 and the short-term macroeconomic forecast produced by the Directorate-General for Economic and Financial Affairs in May 2017 (see Cedefop and Eurofound, 2018).

1 Modelling assumptions

The main inputs to this scenario are assumptions for the changes in trade tariffs between the US and the EU, Canada, China and Mexico for each affected sector. These tariff changes affect each country's import prices, competitiveness and trade volumes. For example, in the model, tariffs introduced by the US on imports from China lead to substitution of Chinese products with US products or imports from another country. In both cases, higher tariffs result in higher consumer prices both directly and because increased costs for US firms are passed on to consumers. We assume that US action prompts retaliatory measures by the targeted country, and that these impact US exports directly. Generally, countries that are directly targeted by tariffs may be expected to see negative impacts on GDP, whereas tariffs may have either a beneficial or detrimental effect on the GDP of third countries. For example, in a bilateral US–EU dispute, the EU would be directly and negatively affected. In a bilateral dispute between the US and China, the EU would be a 'third country'; it could benefit by increasing market share in the US and China, or suffer if exporters redirect their exports from their original markets to the EU.

The key assumptions of this scenario are:

- the breakdown of NAFTA, leading Canada, Mexico and the US to revert to most-favoured-nation (MFN) tariff rates,[1] as agreed by the World Trade Organization (WTO)
- a 25-percentage-point increase in US tariffs on imports from China across all manufactured and agricultural goods
- China introduces similar tariffs, adding 25 percentage points to tariffs on all manufactured and agricultural goods imports from the US in response
- the introduction of tariffs between the US and the EU, adding 25 percentage points to tariffs on all agricultural and manufactured goods

The changes to tariffs are implemented as a single, one-off, sustained change from 2019.

While the assumption of a breakdown of NAFTA has been superseded by the agreement announced at the start of October 2018, changes to NAFTA have a limited impact on the EU. The assumptions for the US and China are in line with recent developments, such as the levying of new tariffs announced in July 2018. By October 2018 there had been no further developments regarding a potential ramping up of US–EU trade barriers and so the assumptions in the modelling are more pessimistic (and cover a wider range of products) than what has so far been implemented.

1 The MFN tariff is the tariff that WTO member countries agree to impose on all of their trading partners who are also WTO members, unless the country is part of a preferential trade agreement (such as a free trade area or customs union). This means that, in practice, MFN rates are the highest (most restrictive) tariffs that WTO members charge one another. The source for the MFN tariff rates is the World Bank's World Integrated Trade Solutions database.

2 Implementation of the model

Figure 1 illustrates the model inputs and the economic logic of how policy changes are expected to impact the economy. The modelling inputs are shown in the blue panel. The grey panel shows the initial impacts on the economy and the white panel summarises the main linkages and interactions, capturing the knock-on effects of tariffs on the wider economy. The figure captures interactions within a country as well as between countries.

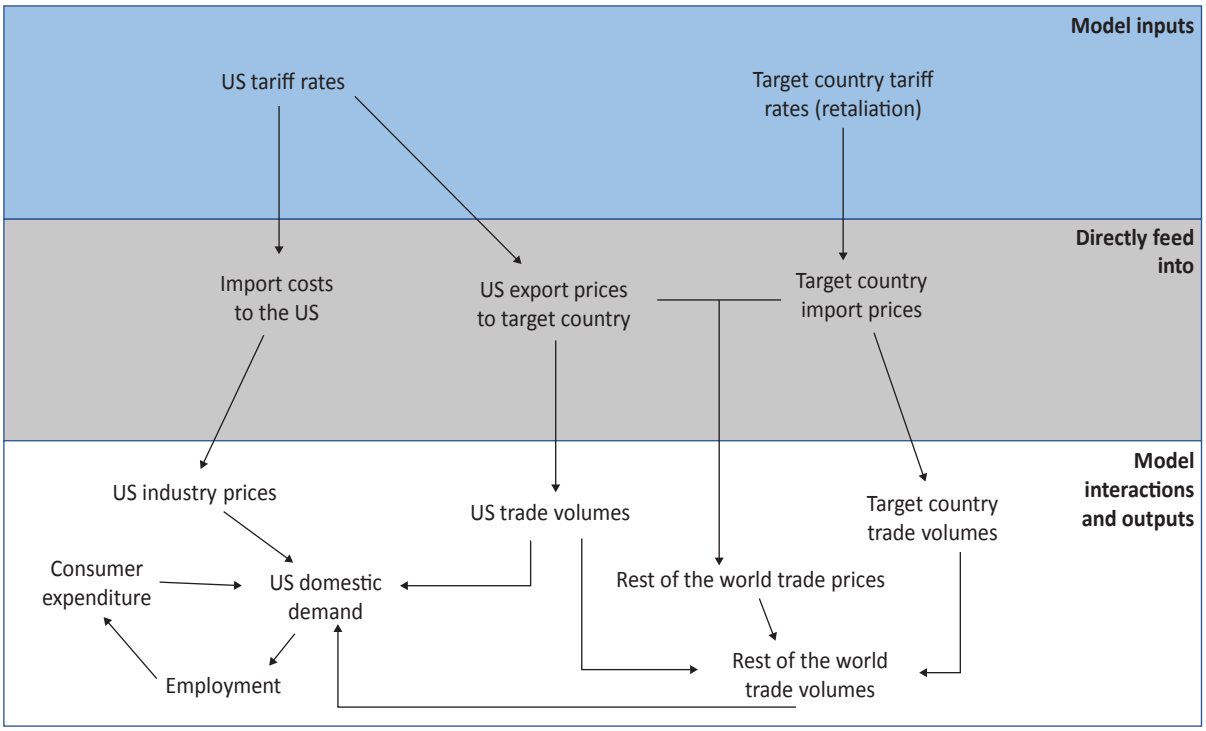
The figure shows the model links illustrated for the case of the US. In the top-left corner, the introduction of tariffs on US imports leads to higher import prices for US purchasers, whether these are final consumers or US domestic industries. US domestic industries using imports therefore face higher costs, even if they mitigate the impact by switching to purchases from US-based producers or from a third country. These higher costs are ultimately passed through, at least in part, to final consumers, reflected in higher consumer prices and resulting in lower real disposable incomes (and real consumer expenditure). To the extent that there is a boost to purchases from domestic producers as a result of the protectionist measure, there may be higher production and employment in some sectors, partly offsetting the consumer price effect on incomes and spending. The higher costs faced by US domestic producers affect export competitiveness and this impact is exacerbated further as retaliatory tariffs are introduced in US export markets.

The introduction of tariffs on Chinese imports to the US is expected to benefit producers in third countries such as India, which are not subject to additional tariffs and so increase their exports to the US to take up some of the market previously served by China.

The bottom-left corner of Figure 1 shows the link between reduced employment and consumer expenditure. The way that this operates in the model is as follows. When jobs are lost, some of the impact on formal unemployment is mitigated by a reduction in labour market participation as some people are discouraged from seeking employment. The reduction in gross wages leads to a reduction in income tax and social protection revenues to government and a reduction in post-tax incomes to households, mitigated in part by higher unemployment benefit payments in proportion to the rise in formal unemployment. The net reduction in household incomes then leads to a fall in consumer expenditure.

The same logic applies for any country that imposes a tariff: costs and prices are increased within the country, domestic producers and third countries gain market share at the expense of the targeted imports and exporters suffer the impact of retaliatory action in their markets.

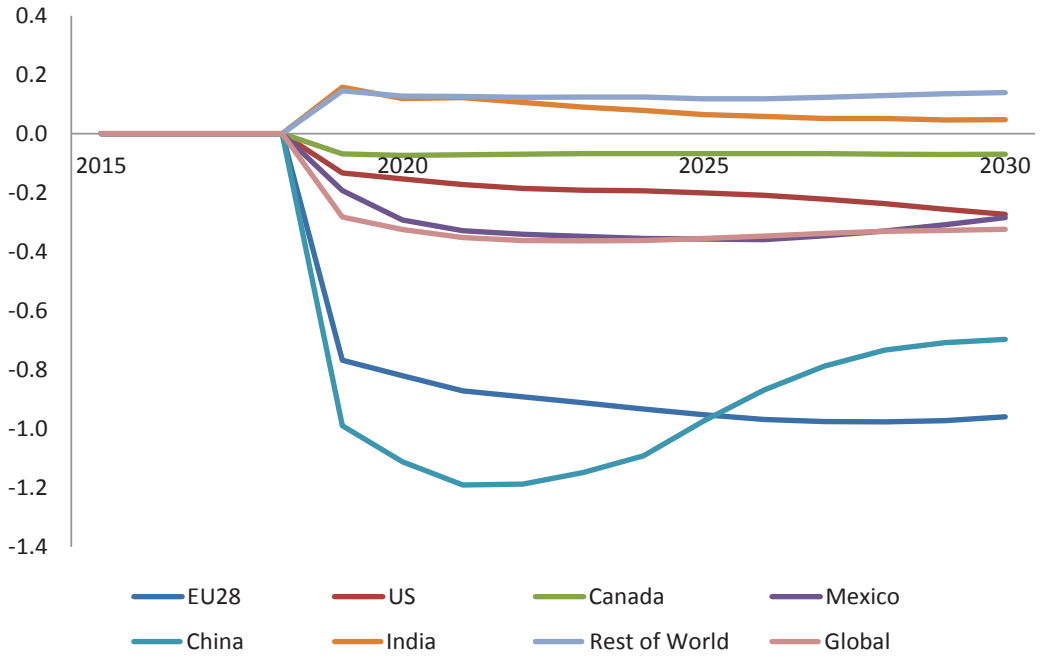
Figure 1: Trade protectionism scenario inputs and model links for the US economy



Source: *Unless otherwise stated, figures are based on research on this scenario.*
Note: *The same principal effects apply to the other regions of the world impacted by tariff increases.*

3 The results of the scenario

Figure 2: GDP impacts by country/region (percentage difference from baseline in which tariffs are not raised)



Overview of global impacts

The projections are reported in terms of differences from a baseline projection (see Box 1) that did not assume any changes in global tariff rates.

Figure 2 shows the percentage difference in GDP between the trade scenario and the 'no new tariffs' baseline, reflecting the year-by-year impacts that follow from the introduction of the additional tariffs in 2019. In the trade scenario, GDP is expected to be lower than the baseline in the EU, Canada, China, Mexico and the US. At less than 0.1%, the impact on Canada is small. For the US, the negative impact increases from 0.1% in the first year to 0.3% by 2030, mainly reflecting the pass-through to higher food prices. The impact on China is initially larger with a 1% decrease in GDP compared to baseline, but the model predicts that over time China will be able to increase exports to other markets, including the EU, and redirect its sourcing of imports to Asian countries at modest additional cost, so the initial negative impact levels out and experiences a new GDP increase in the longer term. Like China, the EU sees a large initial negative impact of 0.8%. However, after the initial fall, GDP only marginally recovers over time as China redirects its exports to the EU. The model's trade equations predict that the EU is less able to redirect its sourcing of imports to relatively low-cost alternatives. Because their products are not subject to additional tariffs in the scenario, exporters in India and the rest of the world gain market share in the countries engaged in the trade war and so GDP is higher in these global regions.

In 2018, similar results were also found by the Netherlands Bureau for Economic Policy Analysis (Centraal Planbureau, CPB) which, using a different economic model, carried out a scenario analysis of a US–EU trade war and a US–China trade war. The CPB found that the introduction of 5% tariffs on all goods led to a 0.9% reduction in GDP for the US compared to baseline in 2030, a 2.9% reduction for China and a 1.7% reduction for the EU (Bollen, J. and Rojas-Romagosa, H., 2018). Notably, the CPB's results are consistent with our trade scenario finding that the US is affected to a lesser extent than China and the EU in a trade war: the cost to the US economy of higher import prices is mitigated by a reduction in its trade deficit, whereas China and the EU experience a reduction in their trade surpluses. However, our trade scenario adds to this by identifying an improvement in China's position over time but not for the EU. The basic logic of these comparative results is the large trade surplus in both the EU and China and the deficit in the US.

Summary of EU results

Table 1 shows the impact on key EU macroeconomic indicators in selected years as a percentage difference from baseline. The negative impact on GDP of 1% in 2030 is driven by lower export volumes (mainly to the US) and higher consumer prices. As a result of lower GDP, employment in the EU28 is expected to be 0.3% lower in 2030 than in the baseline. Imports are also expected to decrease by 1.1% compared to baseline as a result of lower economic activity and, as a result, lower demand for goods.

Table 1: EU28 macroeconomic impacts, percentage difference from baseline

	2020	2025	2030
GDP	-0.8	-1.0	-1.0
Consumer spending	-0.4	-0.5	-0.5
Investment	-0.3	-0.5	-0.5
Exports	-3.8	-3.9	-3.9
Imports	-0.9	-1.1	-1.1
Employment	-0.2	-0.3	-0.3
Consumer prices	0.2	0.4	0.4

Figure 3 below further unpacks the impact of tariffs on the GDP of each Member State in 2030. In all countries apart from Luxembourg and Malta, the impact on GDP is negative. The most sizeable negative impacts are experienced in the Netherlands (2.1% of GDP below the baseline), Hungary (2.0%) and Germany (1.9%).

Germany is Europe's largest exporter to the US and is therefore particularly vulnerable to higher US import tariffs. The US market is also relatively important for Hungary, hence the negative GDP impacts observed there. The Netherlands suffers from the direct impact of lower trade volumes to the US, and also more generally from weaker economic activity in the EU, as the Netherlands acts as one of the main ports for EU trade with destinations outside the bloc. For Malta and Luxembourg, the slight increase in GDP is the result of decreasing imports due to higher prices and reduced demand, slightly outweighing the reduction in exports, thus modestly improving the trade balance. In the case of the United Kingdom (UK), manufactured exports to the US are less important for the country's economy than they are for Germany. Furthermore, UK exports are more service-oriented, and are not directly affected by the tariffs.

Impact on employment

Figure 4 shows the impact on employment in 2030 by Member State. Similar to the impact of tariffs on GDP, the implications for employment are negative in almost every country, albeit on a smaller scale. There are some differences in the ranking of countries compared to the impact on GDP, reflecting the differences in sector effects by country and differences in sector intensities of employment. Generally, the impact on employment is roughly half that of the impact on GDP but there are exceptions, notably the Netherlands, Luxembourg and Malta.

Figure 3: Impact on GDP in 2030 by Member State, percentage difference from baseline

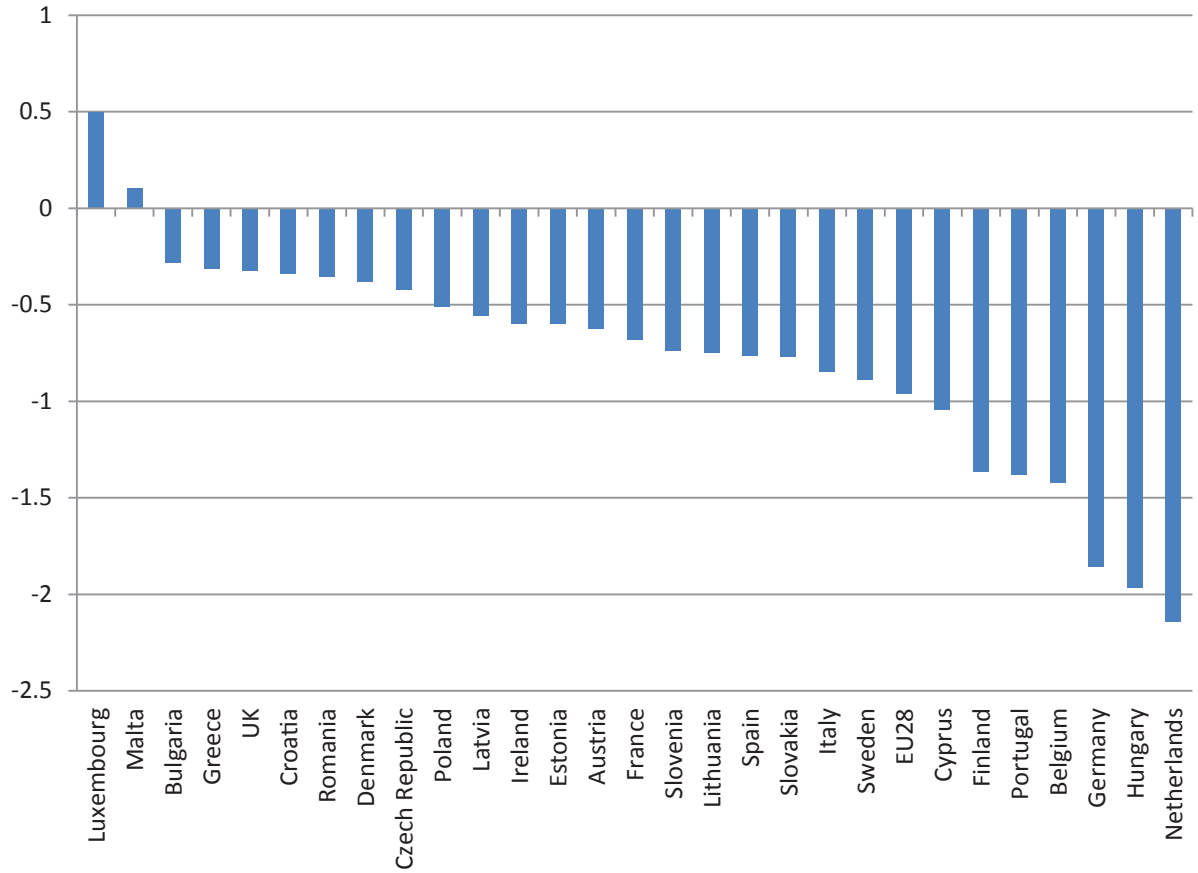
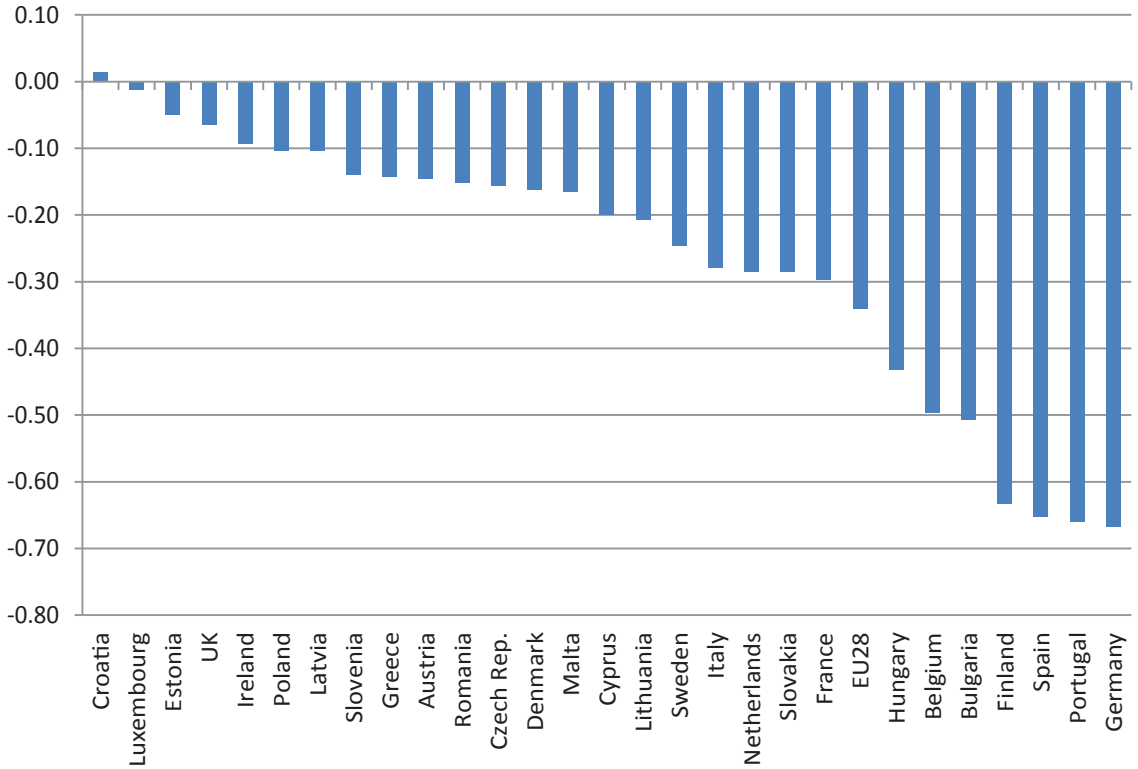


Figure 4: Impact on employment in 2030 by Member State, percentage difference from baseline



In the case of the Netherlands, the sectors most affected by trade are not the most labour-intensive in the economy. Some sectors also see a decrease in average wages, which mitigates some of the impact on jobs from decreases in production.

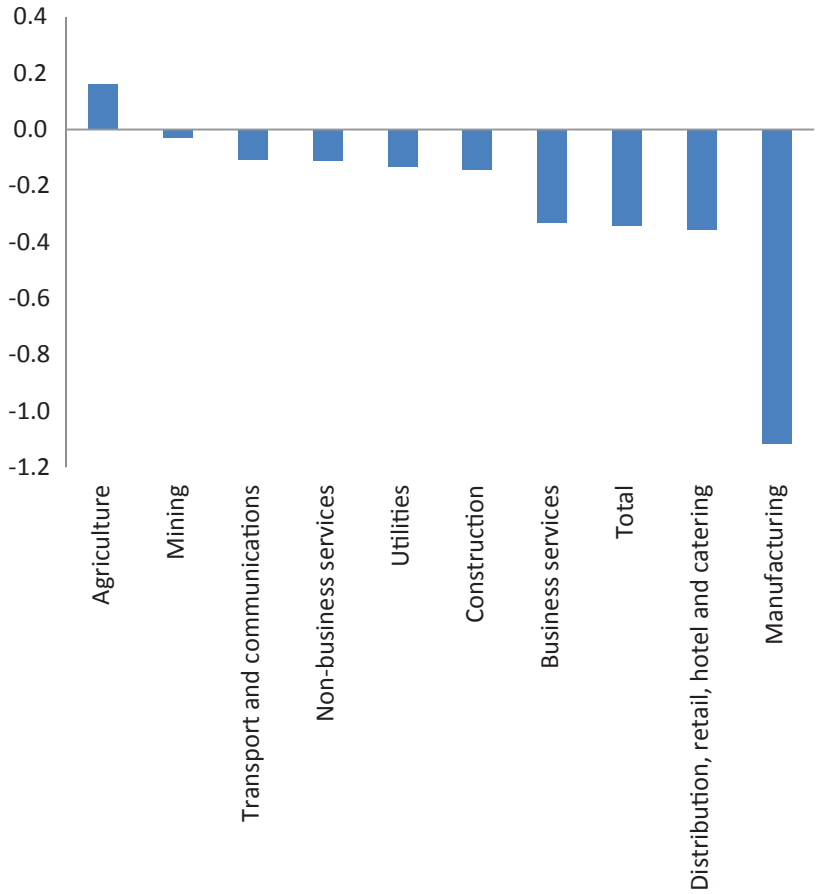
In the case of Luxembourg, the impact of tariffs leads to a slight improvement in the trade balance, as its exports of financial services are not directly targeted by the tariffs. The net beneficiaries are mostly engaged in investment activity, meaning the sectors that benefit are not the most labour-intensive in the economy: the overall employment impact is mostly negligible. Malta also sees an improvement in the trade balance, and thus a positive impact on GDP. However, the higher costs faced by the economy lead to a decrease in domestic production and lower employment.

Spain and Bulgaria are among the countries experiencing the largest impacts. The result for Spain reflects slightly greater sensitivity to consumer spending and the importance of consumer services jobs in its economy. The result for Bulgaria reflects the sensitivity of the country's significant textiles industry to the protectionist measures.

Sectoral results

Figure 5 shows the impact on EU28 employment in 2030 by broad industry group. As manufacturing is directly affected by the tariffs, with a 1.1% decrease, this sector sees the largest percentage impact of tariffs on employment. The impacts on services sectors reflect the second-round effects of lower economic activity and, in particular, lower consumer expenditure due to higher prices and loss of income from job loss in the sectors directly affected by the higher tariffs. Large employers such as distribution and retailing and business services are expected to see impacts in the range of 0.3–0.4%.

Figure 5: Impact on EU28 employment in 2030 by broad industry, percentage difference from baseline



Within manufacturing industry, most sectors are expected to see a decline in employment because of increased costs of inputs and a loss of export demand. Textiles and clothing, motor vehicles and the chemicals sector are expected to see the largest losses in absolute terms, reflecting the size of these sectors in the EU economy and the loss of the export market. The impact on food, drink and tobacco, pharmaceuticals and electrical equipment is modest by comparison. Business services are also impacted by the higher tariffs as most sectors in this category are part of the supply chain of manufacturing sectors. The higher prices and loss of wages mean less spending on household consumption which not only affects manufacturers of the goods but also producers of the services linked to distribution and, more broadly, of consumer services.

A few countries see an increased demand for agricultural goods. In some cases, domestic demand increases, as the drop in incomes results in changing patterns in consumer expenditure with more money spent on food and other basic items, as is the case in Bulgaria and Cyprus for example. In some countries, where the agriculture sector is dominated by family farming, such as Italy, Poland and Romania, the higher unemployment rates lead to a return to working on the farm, resulting in a small increase in employment in these sectors.

Impact on the occupational wage structure

The projected patterns of net change in employment by occupation in the trade scenario are very similar to those in the baseline. The impact of the scenario on jobs in manufacturing is reflected in a loss of jobs relative to the baseline for science and engineering occupations and the various manufacturing trades. The knock-on effects operating through lower wage incomes and lower consumer spending are evident in occupations in hospitality and retailing, customer services and sales.

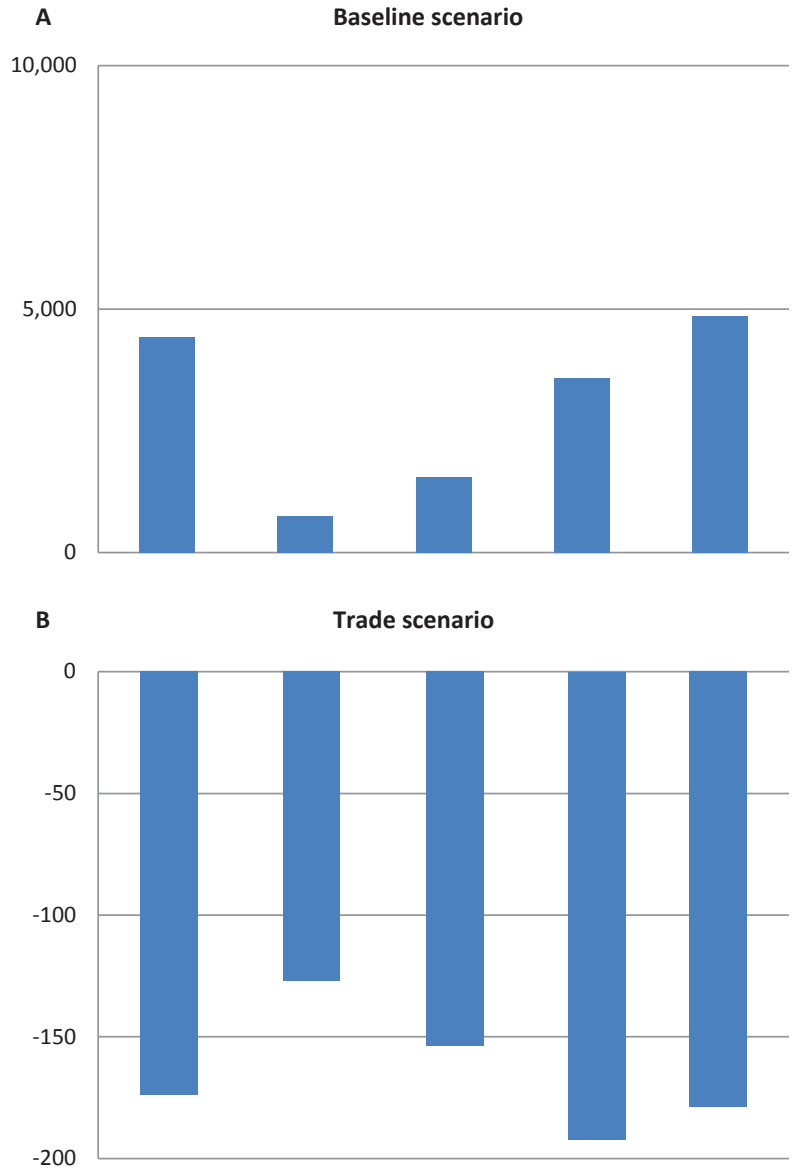
A more nuanced picture of the employment impacts can be obtained by incorporating the sector by occupation employment projections into a classification of jobs, as developed by Eurofound in the European Jobs Monitor. Such an approach was applied to the Cedefop projections, which are the baseline in this trade scenario (see Eurofound, 2018). Box 2 gives a brief description of the methodology.

The distribution of job–wage quintiles and their relative differences in both the baseline and trade scenarios are presented in Figure 6.

Box 2: The European Jobs Monitor (EJM)

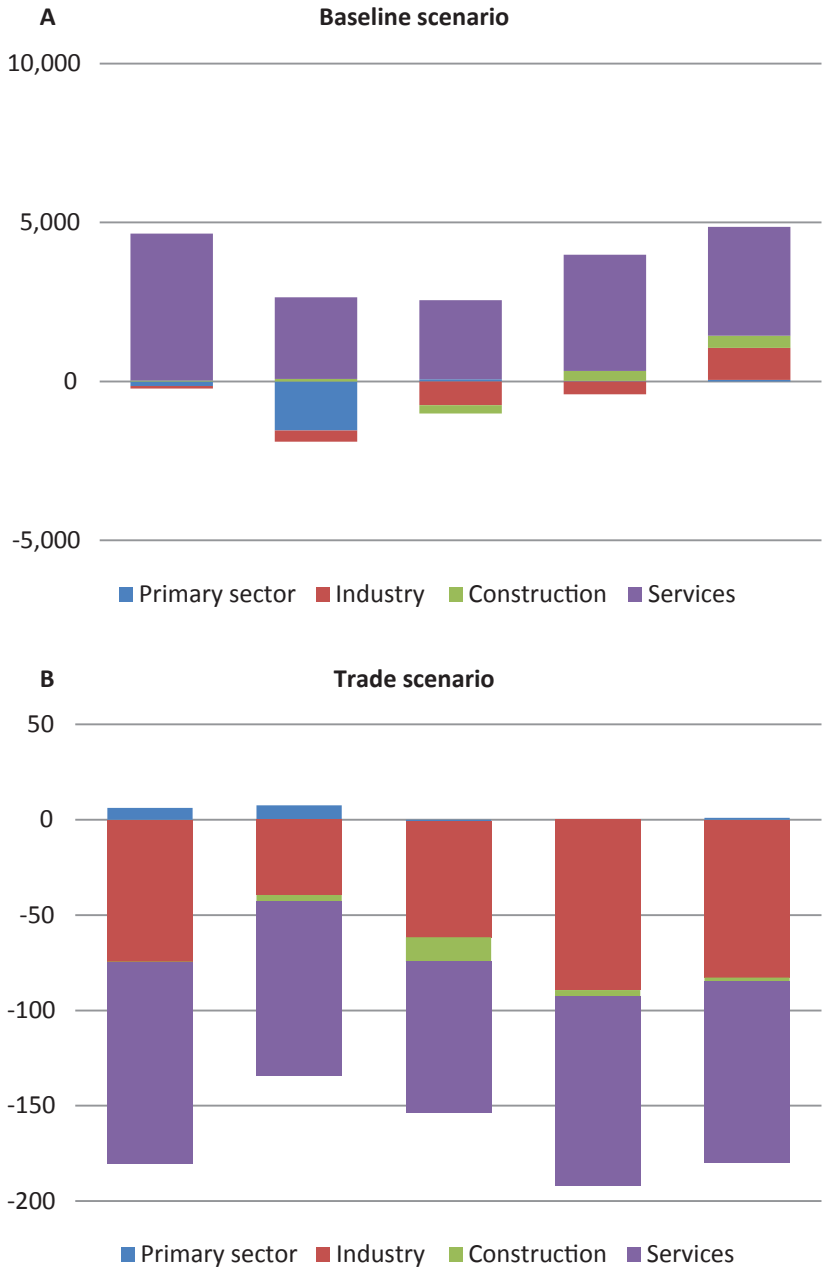
In the EJM, a job is defined as an occupation in a sector, as in the standard international classifications of occupation (ISCO-08) and sector (Nomenclature of Economic Activities in the European Community (Nomenclature statistique des Activités Économiques dans la Communauté Européenne, NACE) Rev 2.0) at two-digit level. The number of jobs so defined varies from 400 in the smaller Member States to just over 2,000 in the larger ones. As jobs are empirically defined by standard statistical classification, a further description of these jobs can be added using data from a variety of sources that follow these same classifications of occupations and sectors. The average wage in these jobs is a useful metric for capturing some of the characteristics and drivers of recent and future structural change in Europe. The wage data are compiled by combining data from the European Union Labour Force Survey and the Structure of Earnings Survey. The jobs are ranked from the highest to the lowest wage in each Member State. They are then allocated to quintiles based on the job–wage ranking for that Member State. Each quintile in each country represents 20% of employment at the starting period. The job-to-quintile assignments remain fixed over time so that the charts presented map the growth of jobs assigned to that quintile at the start of each period of observation (see also Eurofound, 2018).

Figure 6: Job–wage quintiles in the baseline and trade scenarios, EU (2015–2030) in thousands



Source: *Employment forecasts and European Jobs Monitor.*

Figure 7: Job–wage quintiles in the baseline and trade scenario, EU (2015–2030) in thousands, by broad economic sector



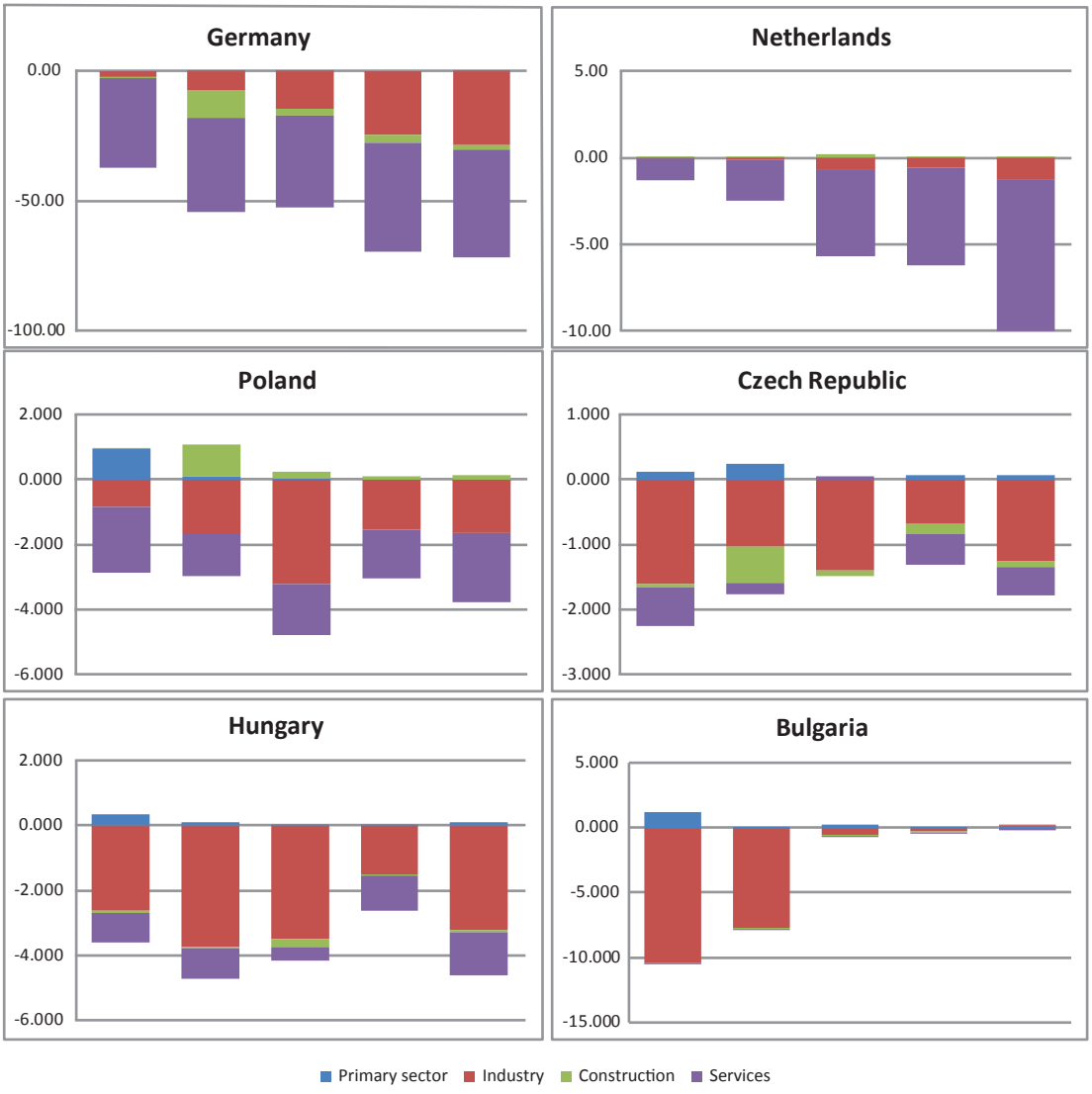
Job growth in the two scenarios is obviously very different as the baseline predicts significant job growth while the addition of the trade scenario leads to job loss. Moreover, the job growth pattern – the distribution among the wage quintiles – is also very different. The baseline shows slower growth in the middle than in the top and bottom while the trade scenario shows more modest decline in the middle with relatively more decline in the two tails.

A comparison of the two panels in Figure 7 shows that the trade scenario shows that, compared to other sectors, the industrial sector shows much more change than in the baseline. Some understanding of the types of jobs lost in the trade scenario can be read from a selection of country results presented in Figure 8.

Figure 8 shows that most job loss in Germany is in the higher wage quintiles, accompanied by considerable loss, also in the high quintiles, in associated business services. While Germany is the clearest example of this, similar developments can be found in Austria, Finland and France. The Netherlands, like Germany, also shows relatively extensive job loss but primarily in services. This is in part related to the highly significant role that the Netherlands plays in the external trade of the EU. The role of Rotterdam in this context is well known but there are a number of other Dutch logistic and

distribution centres with other trade-related services. No other country in Europe shows a pattern anything like that shown in the Dutch results. This may also be attributable to the fact that transit re-exporting activities in the Netherlands (*wederuitvoer*) accounts for 50% of all Dutch merchandise exports (De Kruijf, 2018). The Dutch industrial employment contribution to the value added of these goods is very limited. The Czech Republic and Poland (both with relatively much less job loss, relative to total employment) show a much more even wage quintile distribution of job loss and with fewer jobs lost in services. Bulgaria and Hungary are the central and eastern European nations with the largest overall job loss (see Figure 5). The relative decline in the bottom two wage quintiles in Bulgaria is entirely attributable to the industrial sector and is the largest relative decline in any of the wage quintiles reported here. This is primarily attributable to some manufacturing subsectors particularly exposed to tariff hikes; for example, the textile subsector.

Figure 8: Job–wage quintiles in the trade scenario (differences from the baseline) in selected Member States and broad economic sector, 2015–2030 in thousands



4 Concluding remarks

Given the recent incidence of significant tariff hikes in global trade, the importance of manufacturing in EU exports and the high relevance of tariffs for manufacturing goods, considerations about the future of manufacturing in Europe must be framed in the context of recent and possible future developments in global tariffs. In the model applied in this report, tariffs are assumed to increase by 25 percentage points in the three major global trading blocks of China, the EU and the US, representing a more severe increase than is currently being applied.

The headline macroeconomic finding is that while all the big three lose GDP from increased tariffs, the US loses much less than China and the EU. The obvious explanation for this is the trade surplus – primarily attributable to manufacturing – in China and the EU and the large deficit in the US. Other parts of the world see a GDP increase due to trade diversion effects.

The negative effects occur very quickly after the tariff hikes, particularly for China and the EU. However, recovery in China is quicker than in Europe, as the model predicts that over time China is able to increase exports to other markets, including the EU, and redirect its sourcing of imports to Asian countries at modest additional cost. The model's trade equations predict that the EU is less able to redirect its sourcing of imports to relatively low-cost alternatives. The EU GDP effects are primarily driven by lower export volumes (mainly to the US) and higher consumer prices. The largest negative impacts are experienced in the Netherlands (2.1% of GDP below the baseline), Hungary (2.0%) and Germany (1.9%).

The EU-wide decline in GDP translates to a 0.3% fall in employment in the EU28 by 2030 compared to the baseline. Imports are also expected to decrease by 1.1% as a result of lower economic activity and, as a result, lower demand for goods. The impact on employment in the Member States by 2030 is similar to the GDP effect and is negative in almost every country, albeit on a smaller scale.

Manufacturing sees the largest percentage decrease in employment (-1.1%). The impacts on services sectors reflect the second-round effects of lower economic activity and, in particular, lower consumer expenditure due to higher prices and loss of income from job loss in the sectors directly affected by the higher tariffs. Large employers such as distribution and retailing and business services are expected to see impacts in the range of 0.3–0.4%.

While the baseline predicts a rather polarised picture of employment by wage class, with growth at the top and bottom of the occupational wage structure, the net employment decline in the trade scenario shows a more significant decline in the tails than in the middle. In Germany, much of the job loss is in the top two wage quintiles. While the impact on the industrial sector is of course large, many associated services jobs are also lost. In some of the less developed economies (Bulgaria being a prominent example), the relatively large decline in low-wage jobs occurs overwhelmingly in industry. In more developed economies, decline in the low-wage quintile is more a result of loss in services particularly sensitive to falls in consumer demand.

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